

REMARKS

Initially, Applicants thank the Examiner for finding allowable matter in claims 14, 15, and 19-35. Applicants have cancelled claim 2 without prejudice. Importantly, Applicants have cancelled claim 2 for reasons unrelated to patentability. Applicants reserve the right to prosecute any and all cancelled claims in one or more continuation, continuation-in-part, or divisional applications. Applicant has amended independent claims 1 and 36 to highlight the distinctions between the present invention and the cited art. Furthermore, Applicant has amended claims 5, 15, and 45-47 for cosmetic reasons. Applicants believe that the foregoing amendments and the comments that follow will convince the Examiner that the rejections and objections in the June 19, 2003 Final Office Action have been overcome and should be withdrawn.

I. THE INVENTION

The present invention is generally an improved centrifugal separator capable of separating even fine particulate from a fluid flow. Importantly, this centrifugal separator requires no filters, vacuum bags, or liquid baths because it utilizes a highly efficient fluid

flow. Thus, separation performed by the present invention is efficient and low-maintenance.

The preferred embodiment of the present invention utilizes concentric tubing for input and output ducts. Specifically, an inner tube is coaxially disposed within an outer tube such that fluid may flow into the separator via the inner tube and exit the separator via the annular duct formed between the inner and outer tubes. A toroidal vortex nozzle may be formed at the end of the inner and outer tubes to create a toroidal vortex vacuum system. However, the present invention can be used in any system that requires the separation of matter from fluid flow.

The separation of the present invention occurs in a separation chamber, and the separated matter is collected in a collector located on the side of the separation chamber. Preferably, an impeller is implemented to move fluid flow through the system. In operation, the centrifugal separation proceeds as follows: fluid flow is pulled into the inner tube via suction created by the impeller; the impeller spins the fluid flow (at its blade speed) into a cylindrical vortex; the fluid flow travels along the wall of the separation chamber while matter is centrifugally ejected into the collector; and cleaned fluid

flow is expelled out the annular duct between the inner and outer tubes.

Importantly, the present invention has numerous advantages over conventional separation devices in the art.

5 First, the impeller fulfills the dual purpose of providing the necessary suction and spinning the fluid flow into a cylindrical vortex. Consequently, fluid flow can be spun at extremely high speeds. Also, a pressure exceeding the pressure in the separation chamber is developed inside the
10 collector. This higher pressure helps maintain the cylindrical vortex fluid flow without impeding the matter from being centrifugally ejected into the collector. Because separation is centrifugal, separators of the present invention may operate in any orientation.
15 independently of gravity. Additionally, the high speed vortex allows even small particulate to be separated without the use of filters, vacuum bags, or liquid baths that compromise the fluid flow's efficiency. Moreover, only smooth directional changes are made to the fluid flow,
20 allowing for an energy efficient flow design. Consequently, the present invention provides a highly efficient separation system that is simple in design and requires virtually no maintenance.

II. THE EXAMINER'S OBJECTIONS

The Examiner objected to claims 2-6, 8-10, 13, 16-18, 37, 38, 40, 41, and 45-47 for being dependent upon a rejected base claim, but would be allowable if rewritten in dependent form incorporating all limitations of the base claim.

III. THE EXAMINER'S REJECTIONS

10 A. 35 U.S.C. § 102(b)

The Examiner rejected claims 1, 7, 11, and 12 under 35 U.S.C. § 102(b) as being anticipated by Oh et al. U.S. Pat. No. 6,432,154 (hereinafter referred to as "Oh"). The Examiner contends that Oh teaches a

15 "centrifugal separation system comprising fluid
delivery means (air intake channel 17a) for
providing a cylindrical vortex flow, a separation
chamber (11) for containing the flow, a
20 collector (13) for collecting matter, wherein the
fluid flow centrifugally ejects the matter
therefrom into the separation chamber (see figure
3). Oh et al further teaches wherein the
separation chamber is cylindrical. Oh et al
25 further teaches wherein the collector and the
separation chamber are configured such that a
pressure is developed in the collector that is
greater than the pressure in the separation
chamber. Oh et al further teaches wherein the
30 matter is selected from the group consisting of
dust, nails, screws, dirt, and sand."

The Examiner also rejected claims 36 and 39 under U.S.C. § 102(b) as being anticipated by Oh. The Examiner argued that:

5 "Oh et al teaches a method of centrifugally separating matter from a fluid comprising the steps of providing a cylindrical vortex fluid flow within a separation chamber, and centrifugally ejecting the matter into a collector. Oh et al further teaches the step of
10 creating a higher pressure in the collector than in the separation chamber such that the cylindrical vortex fluid flow is maintained without impeding the matter from carrying into the collector."

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IV. THE EXAMINER'S OBJECTIONS AND REJECTIONS SHOULD BE
WITHDRAWN

A. CLAIM OBJECTIONS

The applicants respectfully submit that the Examiner's
20 objections should be withdrawn in view of the amendments to independent claims 1 and 36, discussed *infra*.

B. CLAIM REJECTIONS UNDER 35 U.S.C. § 102(b)

The Examiner has rejected claims 1, 7, 11, 12, 36 and 69 under 35 U.S.C. § 102(b) as being anticipated by Oh.

25 Applicants direct the Examiner to newly amended independent claims 1 and 36. Applicant has amended these two claims to include the limitation that the means for providing a vortex fluid flow is/are powered by a motor. Because Oh does not teach or suggest this step (as the

Examiner indicated in his objection to claim 2), Applicant submits that these claims are now in condition for allowance. Accordingly, dependent claims 7, 11, 12, 36, and 39 are also in condition for allowance. Furthermore, 5 applicants respectfully submit that in light of these amendments, the above-mentioned objections should be withdrawn.

In light of the foregoing amendments and remarks, Applicants submit that the specification, drawings, and all 10 pending claims are now in condition for allowance.

CONCLUSION

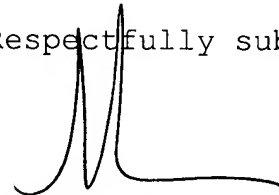
Applicants submit that all pending claims represent a patentable contribution to the art and are in condition for allowance. Early and favorable action is accordingly
5 solicited.

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Date: _____

8/5/03

Respectfully submitted,



John W. Olivo, Jr.
Reg. No. 35,634
Ward & Olivo
382 Springfield Ave.
Summit, NJ 07901
908-277-3333

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